THE DISCOURAGEMENT OF ELEMENTARY MATHEMATICS

IN GENERAL EDUCATION AT OXFORD, CONSIDERED IN A LETTER TO THE REV. THE VICE-CHANCELLOR

Thomas Dyke ACLAND

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Athenæum Club,
Feb. 25, 1867.

MR. VICE-CHANCELLOR,

It is with no little diffidence that I forward this Letter, which you have kindly allowed me to address to you. I am aware of the disadvantage under which anyone labours, who, not being familiar with the daily working of a system, comments on its details; and of the risk which he runs, if he not only points out apparent defects, but also suggests remedies.

I could not have taken this step if I had not been made aware that there is a deep and widely-spread feeling that the present state of our examinations is not satisfactory.

I am yielding to the suggestion of more than one distinguished member of the resident body, that I may render a public service by giving formal expression to that feeling.

I trust that I shall say nothing inconsistent with my own grateful sense of what is due to the University as an Institution, and to many of its resident members for their personal kindness.

(1.) The subject to which I invite your attention is the present position of the University of Oxford with reference to the study of Elementary Mathematics as a branch of a liberal and general education.

By *Elementary Mathematics* I do not mean Euclid and the first part of Algebra only; nor, on the other hand, do I include in that term such subjects as require the Differential Calculus. It will suffice for the present to say, that I mean such elementary knowledge as supplies the

Mathematical principles underlying the calculations of distance, weight, force, and motion, which occur in the ordinary business of life.

By *general education* I do not mean academical education as a whole, in contradistinction from professional, or technical instruction; I intend to point more particularly to that part of our Oxford course which is in a marked sense general, and preparatory to special attainments in History, Philosophy, or Science.

(2.) I address myself to you, as the official resident head of the University, rather than to any of our distinguished Mathematical Professors; first, because I wish to confine myself to the functions of the older Universities, in their relation to the general education of the upper and middle classes, without reference to the encouragement of any branch of Science; and, secondly, because I wish to keep clear of a question which justly excites great interest,—the claims of high Mathematical attainments to more distinct consideration in the disposal of Scholarships and Fellowships.

(3.) The subject of this Letter has been brought under my notice, in the course of the education of those in whom I am most deeply interested; —in the course of my duties as a Delegate of the Local Examinations; —and in the enquiries in which I am engaged with reference to the education of the professional and middle classes throughout England and Wales. I feel, therefore, that I need make no apology for pressing very earnestly the consideration of the position of the University in reference to the general education of the country, both within and without the academical precincts.

In the case of the Undergraduates, to whom I have alluded, being desirous that they should not pass into life entirely ignorant of Elementary Mathematics, and yet that still more important matters should not be sacrificed for this object, I have consulted Heads of Houses, Professors, and Tutors. The evils of which I am about to complain are admitted, but I am told that under the existing regulations there is no remedy; and that in the present temper of the resident body there is little disposition to entertain the consideration of any changes. I

confess that I am more hopeful. I have not forgotten the response of the University to the call for the Local Examinations: I do not despair of other real wants being met now, if they can be shewn to exist.

(4.) The evil of which I complain is this: that men of not more than average ability, willing to improve themselves, and desirous to avoid discredit, are practically discouraged from attempting the study of Elementary Mathematics, as a part of their general and preparatory course, before they apply themselves more particularly to their work in the Final School of Classics, of Law and Modern History, or of Physical Science.

(5.) I am sure that it is needless for me to take up your time by offering any proof that a solid foundation of principles should be laid before special knowledge is imparted. Nor need I dwell on the fact, that such Elementary Mathematical principles, as I am speaking of, are required by students of the class who now frequent the University, —by those who will have landed estates to manage, —by those who will hold Commissions in the Army, or in the Auxiliary Services, —by those who will sit on Parliamentary Committees, or Boards of Railway Directors, —by those who will plead at the Bar, or decide from the Bench on complicated questions of mechanical enterprise, —or last, but not least important, by those who will minister to the spiritual and physical wants of a population living by mechanical labour.

I say nothing on the importance of Mathematics to those members of the professional and mercantile classes, whose claims to receive direct assistance from our great Universities are becoming daily more and more clearly established, because I do not propose to touch on the question of University Extension. Were I to do so, I should greatly strengthen my case.

If so much be admitted, there is one point which must not be forgotten. There is this peculiarity about Mathematical principles, that, if they are not acquired early in life, the deficiency will scarcely ever be supplied later; nor will literary ability, or empirical observation,

however brilliant or extensive, wholly supply the gap which has been left. The exceptions only tend to prove the rule.

(6.) It is hardly possible to consider the due relation of Mathematics to general education in Oxford, without making some reference to the modern system of Examinations. Men who took their degrees before 1850 are apt to deplore the change which then took place, and to sigh for the restoration of the older and simpler system of classes. I cannot sympathize with these retrospective longings; I do not expect to see the Isis roll backwards; it is more to the purpose to try to deepen the main current, and to remove obstructions from the side streams.

But if it be frankly admitted that the new system was an honest, and has been to a certain extent a successful, attempt to correct idleness and ignorance, (as e.g. in the case of Arithmetic,) to ensure accuracy, and to widen our range of studies, it may be allowable to doubt whether much harm has not resulted from narrow and restrictive regulations, consequent on a very doubtful educational theory about the proper order of study. That theory appears to rest on an artificial separation between "words and things," "forms and facts," "pure and applied sciences."

The details, in which that theory has been embodied, seem to have had the effects of postponing some subjects, so that they are hurried over, —of excluding others, —and of prematurely forcing abstract questions and doubts on minds ill prepared to master them. For example, Aristotle's Rhetoric, a favourite with statesmen and orators, from Lord Grenville downwards, has been squeezed out; —the Ethics and Butler are unread by many who seek Honours in Law and Modern History. —The Orators are excluded from the course of History; —Logic, as now taught, with its unsettled and unsettling theories, is forced on all; —a wide range of Physical Science is approached by men who have had no training in Geometry or Mechanics treated mathematically; —and, most remarkable result of all, while men are encouraged in almost every branch of special and separate study, there is one to which no distinctive honour is allowed in the Final Examination, and that is

the Higher Philology; this, too, at a time when sound training in language is most important to Biblical criticism.

I touch lightly on these points, not venturing to detain you longer on a collateral issue; enough, if I have been able to shew, that the point I wish to establish is not at variance with the fundamental principle, or rather with the ultimate aim of the modern system; and that Mathematics do not stand alone in calling loudly for a reconsideration of some of the details.

(7.) The ultimate aim of the modern system I understand to be this, —

That all men should be encouraged to study during their first two years what is *general and fundamental*, and that men of eminent ability in any department should not be cramped, but have all reasonable liberty consistent with the fundamental discipline necessary for all.

I now proceed to shew that Elementary Mathematics do not hold a proper place in this general training, to state the causes of this deficiency, and to suggest some remedies.

(8.) I. *The Facts of the Case.*

It is not quite easy to estimate the amount of Mathematical reading now as compared with former days. The total number of names in the Honour Lists now, as compared with the first years of Classes, would not be conclusive; and of course the difference in the extent of the reading must be taken into account. I think, however, that it may be certainly stated from private sources of information, that the *proportion* of men who read Mathematics beyond Euclid, to *the total number of reading men*, is much below what it used to be in old times.

(9.) i. If we take the Honour Lists of recent years, we may draw some important conclusions as to the present tendency.

In the Final Examinations for the years 1861, 1862, 1863, I find 66 men taking Mathematical Honours; in the next 3 years, 1864, .1865, 1866, 47 men; an average per annum in the former case of 22, in the latter of less than 16; a falling off of more than 25 per cent.

In the Moderations for the corresponding years, I find during the first 3 years, 73 men, during the last 3 years, 50 men, a still greater falling off.

The most remarkable contrast is to be found in the number of men who combined Mathematical reading with Classical. In the first three years there were 20 double honours, in the latter three years there were but 5 double honours at Moderations. At the Final Examinations in the first three years, 5 double honours, only 2 in the latter three years.

How far these facts are to be explained by an increasing difficulty in the Examinations, I am of course unable to judge; but they certainly prove that the Moderation Examinations do not at present encourage general training in Language and Mathematics combined, especially among men whose ability is not above the average.

(10.) ii. It may not be amiss to notice here the difference between Cambridge and Oxford as regards the secondary subject in each, namely, Classics at Cambridge as compared with Mathematics at Oxford in the three years 1863—1865. The numbers stand thus at the Final Examination :—

	OXFORD HONOURS.		CAMBRIDGE HONOURS.	
	Classics.	Math.	Math.	Classics.
1863.....59		24	100	66
1864……..75		19	104	61
1865……..97		10	95	66

In the three years named, Cambridge sent forth 36 men with double honours against 4 sent out by Oxford at the Final Examination, and 12 at Moderations. But this last number includes 7 men in the year 1863, there being but 5 in 1864 and 1865. I find, in the year 1866, none in the Final, 5 in Moderations.

The contrast is instructive, and, as I shall shew, may have serious consequences on the interests of Oxford graduates.

(11.) iii. It is desirable, further, to contrast the Mathematical work done in Oxford with what is done in the schools which send candidates to the Local Examinations.

In the year 1866, out of 312 senior candidates, 269 were examined in Mathematics, 206 satisfied the examiners in that subject, 45 obtained honours.

This is a significant indication of the work of the middle classes, and it should be observed that a higher standard is required of those boys below 18 than is required of Undergraduates at Moderations, so far as Mathematics are concerned.

(12.) iv. The amount of Mathematics enjoined by the University on Passmen, who select the Mathematical School as their Second School, as a condition of obtaining the degree of B.A., is so small that it deserves no notice except as a sad proof of the low standard of intelligence or industry with which the University has to deal. About 150 men per annum have been in the habit of passing through the Mathematical School, such as it is; but this number is said to be diminishing. I am indebted to a Tutor in a large college for a calculation which shews that the percentage of Undergraduates passing through the Mathematical School has been gradually reduced by various causes; and that it is not now more than 4o per cent. on the men of one year.

However this may be, the fact is undeniable that a man may now pass through Oxford, and take a degree, with a schoolboy's knowledge of Arithmetic and Algebra, and without knowing a single proposition in Geometry.

(13.) v. The case of well-disposed men incapable of attaining the highest honours, and yet desirous of a better general education than is tested by a pass examination, deserves more consideration. Let the case be supposed of such a man coming from a good grammar school, with fair knowledge of Grammar, and an acquaintance with Mathematics on a par with that of average candidates for the title of A.A. at the Local Examinations. He will pass his Responsions easily. He would gladly, if the University would encourage him, continue to read Mathematics for

twelve months or more. But his Tutor will tell him that, unless he concentrates his attention on the object of gaining an inferior Mathematical Honour, which is held in low esteem and leads to nothing, he had better drop the subject at once, that it will not pay, that it will distract his attention and impair any chance he may have of success in Classics or in Law and Modern History, that Logic is indispensable, and that any good his friends may hope he will get from Mathematics will be gained from Logic; moreover, he will find out that the Mathematics taken up at Moderations are abstruse, and chiefly valuable as a preparation for the Final School. He will draw the conclusion that, unless he has a good chance of securing a Mathematical Scholarship he has but slender inducement to follow a subject which will count for little in a Fellowship examination.

II. *The Causes of the Facts alleged.*

(14.) i. In attempting to assign causes for the state of things which I have described, I am aware that as a non-resident I am specially liable to error. But when I am told, as I have been told, that the genius of Oxford is Classical and that of Cambridge Mathematical, I feel confident that the suggested explanation is not merely inadequate but incorrect. Classics, so far as the language is concerned, have flourished in Cambridge as much as in Oxford; Oxford, on the other hand, has no cause to fear comparison with any University as to the repute of her few Mathematicians. Cambridge for many years has not allowed Classics to be neglected in her *general education*, nor has she for some time past clogged her Classical scholars with the study of more Mathematics than are considered necessary and sufficient for good general training, and these are disposed of at the previous Examination. Cambridge is now engaged in considering her Classical course, with a view to assimilate it to that of Oxford, so far as to require examination in the matter as well as in the language of books.

A truer explanation of the neglect of Mathematics at Oxford is to be found in circumstances depending on the legislation of the University, and therefore remediable.

(15.) i. Mathematics, beyond Euclid, are proposed to young men as an exceptional study, as a work of supererogation. It seems to be tacitly assumed that in the absence of some special talent or taste for the subject, or of some worldly advantage to be obtained by it, Mathematics are not worth the time they take. In other words, Mathematics are regarded not as a branch of general education, but as a special department of knowledge.

(16.) ii. The course of reading required for Mathematical Honours at Moderations is confined to pure Mathematics; it includes, in the case of high honours, (and all beginners hope for high honours, if any,) Differential and Integral Calculus, and the Calculus of Finite Differences. The subject of Mechanics, as being a branch of applied Mathematics, is postponed till after Moderations. This distribution of subjects is opposed to the practice of Cambridge, and of other places, where Mathematical training is specially attended to. It is at variance with acknowledged principles of method in the mental discipline of ordinary minds. It presents an optional subject in its most abstract, and, to ordinary minds, most repellent form. It involves, moreover, a want of completeness in the first stage of study, since some application of principles to practical problems is almost necessary in order to ensure the complete apprehension of the principles. This element of reality being omitted, the knowledge acquired for Moderation Honours is comparatively unavailable in after life, in the event of Mathematics being dropped after Moderations, with a view to the pursuit of some other subject for the final examination, or to preparation for the exigencies of professional life.

(17.) iii. It is partly an effect, and partly a cause, of the Oxford practice of embodying the details of studies in statutes (as I am informed, though I have some doubt as to the fact how far the details are in the statutes), that there is no Delegacy, or Board of Studies, relating to the studies of members of the University, to which questions of detail may officially be referred, with a view to their being reported upon periodically, or as occasion may require.

The discretion entrusted to the Delegates of the Local Examinations has worked very advantageously, within due limits, and has tentatively and gradually solved some very difficult questions affecting the fundamental principles of religious and secular instruction, the relative value to be attached to different studies, and the best mode of testing the proficiency of candidates.

(18.) III. *The Remedies suggested.*

The circumstances which I have stated appear to account for the fact, that young men, for the most part, soon after matriculation drop Mathematics, and do not resume them after Moderations. They point to the direction in which remedies may be sought. I am aware that I must encounter strong objections from those who dread whatever tends to increase the amount of knowledge required for examination. But though it may be difficult to raise the standard of precision in a particular subject, I am assured that it would not be difficult to require a greater extent of knowledge. I think also there are good grounds for believing that some increase of breadth in the way of general culture of the intellect would add strength to scholarship without impairing its accuracy or elegance.

(19.) i. If it be admitted that some knowledge of Mathematics is indispensable as a branch of general culture, it follows that it should be tested by examination at some period. It may, however, deserve consideration whether Euclid should in all cases be required. Euclid stands, in the opinion of many Englishmen, unrivalled as an instrument of mental discipline, so far as geometrical reasoning is such an instrument. But it must be admitted that it is very repulsive to some minds, especially to those who have been allowed to neglect it at school. I happen to know that it is so little used in France that a very able mathematical professor in a French Lyçée had never seen a copy of Euclid. There are well-established manuals of Geometry, which might answer the purpose of a necessary examination in Geometry for Passmen. It might even be considered whether some knowledge of practical Geometry, as taught at South Kensington, or of Drawing with

Perspective would not be better than the present absolute ignorance of all principles of form and measurement.

(20.) ii. But inducements to industrious men of moderate abilities to give some completeness to their general culture are more important than the question how to deal with Passmen. Care must be taken at the same time not to embarrass brilliant scholars during their preparation for examination. These two objects being borne in mind, I venture to submit the following proposals to your consideration: —

1. That there be included in the examination for Honours at Moderations, to be passed by all candidates for Honours, (unless qualified by previous examination or exempted on the ground of compensation,) such subjects of Elementary Mathematics as are called "the additional subjects" at the Cambridge *previous* examination, or as are included (with others) in the *first* B.A. pass examination of the London University.

I hope I shall not be deemed presumptuous, or held too closely to the terms of my proposal, if I venture, for the sake of distinctness, to specify the following subjects (Euclid and Algebra being presumed): —

The Elementary parts of Trigonometry so far as to include the solution of Triangles, the use of Logarithms (and perhaps their principles.)

The Elementary parts of Conic Sections treated geometrically.

The Elementary parts of Mechanics treated without the Differential Calculus.

2. That the work done in these subjects and in Classics should count cumulatively for a place in the *third* or *second* class (the distinction between Classical and Mathematical classes being so far abolished, but *two distinct first* classes being retained.)

3. That eminent Classical scholarship, such as would now place a candidate in the first class, be allowed to compensate within certain limits for short-comings in Mathematics. Justice and regard to symmetry would alike seem to require that a similar compensating power should be allowed to eminent Mathematical talent and

knowledge in the event of shortcomings in Classics. But, as language is the more universal instrument of thought, and as there is reason to believe that the exclusive study of Mathematics tends to narrowness, the minimum for Classics might be kept higher than that for Mathematics.

There is no reason to fear that Classics would suffer by some such arrangement, they would probably gain.

It might, however, be desirable (as hinted above) to allow eminent Classical scholars to purchase exemption from the burden of preparing for a Mathematical examination at Moderations, by passing in the additional Mathematical subjects at, or shortly after Responsions. I believe that this arrangement for the "Honour Little-go," as it is called at Cambridge, works admirably; it gives a definite purpose and stimulus to the first year's work among ordinary men: a fair amount of necessary information with useful mental training is secured early, and no one is hampered in his special work for the Tripos. Such an examination, passed at the end of one year's residence, is found to be an excellent preparation for the army. The great Field-Marshal, Lord Seaton, attached much importance to University education for officers. Shortly before his death he was in communication with the two older Universities on the subject. He was most anxious that no compulsory requirement of attendance at a military college should make residence at the University impossible. It is obvious that one of the first requisites for the recognition of University examinations by the military authorities in measures for raising the standard of professional knowledge is, that Mathematics should not be neglected.

(21.) iii, That Boards of Studies might with advantage be formed to consider these and similar questions, is a suggestion which follows from what has been already said. But I feel some delicacy in presuming to discuss the machinery of a legislative system of which (except as a delegate in our department, an honour of which I am very sensible,) I have little practical experience. I can, however, testify strongly —as a frequent visitor to the University— to the great dissatisfaction which appears to exist with the want of elasticity in our present system, which

provides no authorized and official channel for the preliminary stages of legislation prior to the initiative on the part of the Council. I am aware of the existence of one or more voluntary associations, but they lack the breadth and authority requisite for acting as the fly-wheel on the steam-engine. Such an element in the working machinery as is needed, should include the Professors of the department concerned, Examiners, and representatives of independent opinion in the University. The reports of such a body could not fail to have weight, even without any power of enforcement, which might provoke jealousy and reaction. There is no lack of precedents elsewhere, and therefore I will not go further into detail.

(22.) I must, however, earnestly represent to you the necessity for some consultative and administrative machinery, by which the University may place itself in relation with the governing bodies of the Medical and Legal professions, and of the public services, Military and Civil, and provide for the due consideration of the relation to professional requirements of its own examinations both in general education, and in special subjects which the University professes to teach. On this subject I will say no more, for you have close at hand better advisers than I am, who have long laboured at the organization of our professorial system, and of our appliances for teaching. But the professors of the physical sciences are not recognised as a faculty; they have no authorized channel of communication with the governing body of the University, or with the outer world.

(23.) I should not have ventured, even after repeated discussions in private during four years, to take the formal step of making the proposals I have laid before you, if I had not been urged thereto by some general considerations to which I beg in conclusion respectfully to ask you to give so much weight as they may seem to deserve.

(24.) i. *As to the present and future influence and independence of the University of Oxford.*

Parliament and Government, acting through Royal and Parliamentary Commissions have, with a mixture of tenderness and

plain speaking, challenged the existing administration of ancient and irresponsible institutions for public education. Some faults have been laid bare, some corrected, some remain in spite of warning. Blame is tossed about from Universities to schools, schools to parents, and back again. Meanwhile the conviction gains ground that the Universities have more means at their disposal than any other body for effecting improvement, and for introducing a healthy organization into our chaotic system of secondary instruction. They have great mental power, much experience (including that gained outside the University by Masters of Schools, and by School Inspectors), enormous revenues, and consequent independence.

It has been to me for many years a cherished purpose to strive to increase the influence of the Universities in *general education*. In 1839 I sought the aid of a great scholar, for whose somewhat peculiar character I had an affectionate respect. I was rebuffed (not unkindly,) by the answer, "Oxford has quite enough to do to teach Greek; it had better mind its own business." I suppose Oxford does not teach Greek worse now for having widened its curriculum, and for having taken the step of examining others than its own members. But I have a strong conviction that Oxford must justify what she has already done, by going much further in the way of extending its care to the general education of the whole nation; and that if it draws back, it will run a serious risk of losing its own independence. It is, therefore, most necessary that the general culture of all its own able, and even average men, should become wider instead of narrower.

(25.) ii. *As to the intellectual and religious training of the members of the University*. Mr. Mill in his very remarkable address at St. Andrew's makes two statements: —

"Youths come to the Scottish Universities ignorant, and are there taught. The majority of those who come to the English Universities come still more ignorant, and ignorant they go away."— p. 10.

"An University ought to be a place of free speculation. The more diligently it does its duties in all other respects, the more certain it is to be that. The old English Universities in the present generation, are doing better work than they have done within human memory, in teaching the ordinary studies of their curriculum; and one of the consequences has been that, whereas they formerly seemed to exist mainly for the repression of independent thought and the chaining up of the individual intellect and conscience, they are now the great foci of manly enquiry to the higher and professional classes, south of the Tweed." —pp. 82, 83.

How far these statements are deserved, or consistent, I will not take on me to affirm or deny. What I venture very earnestly to urge is the conviction, that the intellectual freedom for which Mr. Mill gives Oxford credit, and which, within the bounds defined by Christian humility, I do not desire to abridge, would be more safely exercised, and would be stronger and more healthy, if there were less ignorance of common principles and laws of nature, more security for sound training in exact studies, admitting of definite certainty, requiring care in the statement of the *datum* and the *quæsitum*, imposing due regard to the statement of evidence, before young men are plunged into an ocean of doubt about the reality of the faculties, intellectual and moral, with which we are endowed by our Creator[1].

(26.) Will you excuse my recalling to your recollection an illustration from the political world? Oxford has produced five Financial Ministers who have served since the Reform Bill of 1832, —

[1] I trust, however, that I may without offence observe that among those who have applied themselves of late years to the critical or practical treatment of the New Testament, the Articles and Liturgy, and Reformation of the Church of England, are the names of Mill, Sumner, Trench, Wordsworth, Ellicott, Alford, Lyttelton, Vaughan, Harvey Goodwin, Westcott, Lightfoot, Conybeare, Howson, Blunt, Procter, Hardwicke, Harold Browne, all Cambridge names. It has been remarked, that with one or two notable exceptions, no Cambridge theological writer with academical distinction has been drawn into the Roman system, or into its opposite. I leave it to others to make the comparison.

Sir R. Peel, and four Chancellors of the Exchequer: Sir F. Baring, (the late Lord Northbrook,) Sir C. Wood, (Lord Halifax,) the late Sir G. Lewis, and Mr. Gladstone. All read Mathematics diligently, all (with the exception of one second class) were in both first classes. I am not prepared to deny that purely Classical scholars have done their part in public life, or to attribute too much to the influence of early Mathematical work: but the coincidence is instructive. The need for exact knowledge in politics is not diminished by their present aspect.

(27.) Nor can I omit to notice the tendency of all Physical Science in its higher forms to exact Mathematical statements of laws. This subject causes anxiety to Oxford men, responsible for scientific instruction, who watch the disposition of the rising generation of Undergraduates to diverge into literary or metaphysical study on the one hand, and into experimental science on the other, without a solid foundation of principles, or even a knowledge of the language in which it is the increasing tendency of science to express itself.

(28.) iii. *The influence of the London University.*

On this subject I need say little, except to ask you not to underrate it. That University is steadily gaining ground; and for these two reasons especially, first, that its examinations are a security against culpable ignorance in either of the three great departments of general education, —*Classics, Mathematics, Physical Science.*

Secondly, because the University gives freedom for the development and just appreciation of special ability in any direction required by the nation.

I must add a third reason.

Its examinations are independent of any tutorial body.

(29.) iv. I have only one more general consideration to set before you. *The approaching revision of the whole system of endowed schools, and of secondary instruction generally.* I cannot pretend to forecast what will be recommended, or what will be enacted on this great and at present chaotic subject. But I may venture, I think, to say thus much, that the country will before long have in its own hands the means of

knowing its own deficiencies and requirements, such means as it has never had yet. It can hardly be but that University men, (I include London of course,) will have an important career before them, if they are duly trained for the work. If Cambridge men and London men are known to be competent in the main branches of fundamental knowledge, in what position will Oxford men be, if they have to compete with one arm tied up? One-sided classical scholars may still find an opening as assistants in schools chiefly or exclusively classical, if any such remain; but the great demand, in the case of inspectors and head-masters, will be for men doubly furnished, at least. I need say no more on this head.

(30.) I have purposely said nothing on the subject of Physical Science as an element in general education, first, because I think the question of Mathematics much more pressing; secondly, because the scientific men can take very good care of themselves, and the subject is generally popular; lastly, and more especially, because I have reason to believe that the highest authority perhaps in the country on the interests of science will shortly communicate with the University on the subject of enforcing science teaching at schools by an early examination at the University.

I have now only to offer to you in conclusion my humble apology for having written at so much length, and, though not without care, I fear with what may seem too much freedom. It has been my object to state facts, as they appear to one outside who takes a deep interest in the future of Oxford, concisely, rather than to discuss principles familiar to those whom through you I presume to address.

(31.) In order to save trouble to any one, to whom you may shew my Letter, and who may not care to read it all, I will add a summary of the practical points to which I wish to call attention.

SUMMARY.

I. That while the division of the Final Examination into Four Schools, and the exemption from the necessity of passing in Two Schools, granted to those who obtain honour in one, are admitted to be beneficial, further provisions are required, in order that what is general and fundamental may be sufficiently tested by previous examination.

II. That it appears—

(*a.*) That a man may obtain the degree of B.A. without the slightest knowledge of Geometry or of Elementary Physics.

(*b.*) That a man may attain the highest honour in Classics, or in Law and Modern History, without any knowledge of Geometry or Physics, and the highest honour in Natural Science without Mechanics, treated Mathematically, or Algebra or Trigonometry.

(*c.*) That Elementary Mechanics are excluded from the Mathematical examination at Moderations, and therefore from the general education of all who obtain honours in any one Final School except the Mathematical.

(*d.*) That the number of men who read Mathematics beyond Euclid is very small, and diminishing.

(*e.*) That approved books of general culture, such as Aristotle's Rhetoric and Ethics, and Butler’s works, being not included even as optional subjects in the examination at Moderations, form no part of the general education of those who obtain honour in any one Final School, except that of *Literæ Humaniores*.

(*f.*) That a Classical scholar, however eminent in scholarship, is excluded from honours in the Final Examination, unless he gives a considerable time to Metaphysics; and that no other special subject is so weighted, and placed at a disadvantage.

III. That these facts (if substantially correct) deserve the serious consideration of the governing body of the University, not only on

account of their effect on the education of the owners of property and of the members of learned professions now educated at Oxford, but also on account of their probable bearing on the future influence of Oxford in the education of the professional and middle classes generally, and on the personal interest and repute of Oxford graduates, in the event of changes in the management of endowed schools.

IV. That it seems desirable to enquire whether, without departing from the broad principle and ultimate scope of the present system of Examinations, it be practicable by redistribution of subjects or otherwise, to require or encourage the study of general and fundamental subjects before Moderations, and by the removal of needless restrictions on the order of study to give more liberty both before and after Moderations.

V. That there is at present no Delegacy or Board of Studies to which these and similar questions might be officially referred, for the purpose of being reported upon prior to any steps being taken to initiate Legislation by statute.

It is assumed in the foregoing summary that the regulations for Examinations, and the practice of Examiners, govern the reading of men both as to selection of subjects and order of study.

In compliance with the advice of a friend, for whose judgment I have great respect, I submit this Letter to you in manuscript, in the first instance. In doing so, I neither ask nor expect any answer from yourself.

I must, however, reserve to myself the liberty to shew a copy of it to others, and to give it further circulation should I be so advised, with such amendments as may be deemed expedient.

I have the honour to be,

Mr. VICE-CHANCELLOR,

With great respect,

Yours very faithfully,

T. D. ACLAND, Jun.

POSTSCRIPT.

I have been informed that since this Letter was written, a Statute has passed giving some latitude, as regards time, to candidates for Mathematical Honours; and that further plans are under consideration, having for their object to admit, at an earlier period than is now the case, to the higher studies for which Oxford offers great opportunities, students who are prepared to give proof that they have already gone through an adequate course of general and preparatory study. It is impossible to rate too highly the important influence which such plans may exercise on general education, not only within the walls of the University, its Colleges, and its affiliated Schools; but in other institutions hitherto unconnected with the University. I therefore think it best not to delay forwarding a copy of this Letter to Members of Council, and to some personal friends who may be disposed to consider how far our present tests of general education are satisfactory, either in themselves or in reference to more special studies.

March 25.